Woodcock

WOODCOCK STATUS REPORT, 1976

LIBRARY
GREAT SMOKY MOUNTAINS
NATIONAL PARK
NOV 2 9 1977

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Special Scientific Report—Wildlife No. 209

Use of trade names does not imply U.S. Government endorsement of commercial products.

WOODCOCK STATUS REPORT, 1976

By Joseph W. Artmann

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Special Scientific Report—Wildlife No. 209
Washington, D.C. • 1977

Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

http://archive.org/details/woodcockstatusre00artm

Woodcock Status Report, 1976

by

Joseph W. Artmann[1]

U.S. Fish and Wildlife Service
Office of Migratory Bird Management
Patuxent Wildlife Research Center
Laurel, Maryland 20811

Abstract

Wing-collection and singing-ground surveys of woodcock *(Philohela minor)*, which are conducted rangewide in the United States annually, were compared to identify changes in harvest, age ratios in the harvest, hunting activity, and breeding population indices between 1974-75 and 1975-76. During 1975-76 the productivity index decreased 13% rangewide, 10% in the Atlantic Region, and 16% in the Central Region. Rangewide, the daily hunting success index decreased 3%, whereas the seasonal hunting success index decreased 1%. Daily hunting success indices decreased 3% in each region, whereas the seasonal hunting success index increased 6% in the Central Region and decreased 6% in the Atlantic Region. The breeding index increased 3% rangewide, decreased 2% in the Atlantic Region, and increased 6% in the Central Region.

During the past decade American woodcock (*Philohela minor*) have become an increasingly popular game bird over most of their U.S. range (Fig. 1). State and Federal surveys show that the number of woodcock hunters is increasing. Thus, woodcock have advanced from a "speciality" game bird, sought by a few ardent hunters, to a broader-based recreational resource pursued by many sportsmen. Owen (1976) estimated that woodcock provide between 2.5 and 3.0 million man-days of hunting in the United States annually.

No suitable sampling framework is available to determine total annual woodcock harvest by all U.S. woodcock hunters. Presently, woodcock harvest estimates are made by adjusting hunter responses from the U.S. Fish and Wildlife Service's waterfowl hunter questionnaire. Clark (1972) asserted that harvest estimates determined from the Service's waterfowl hunter questionnaire were less than 50% of estimates determined from State surveys. Therefore, he believed that doubling the woodcock harvest of waterfowl hunters would provide a conservative estimate of U.S. woodcock harvest. If Clark's assertion is correct, an average of 1.5 million woodcock were harvested during the 1974-75 and 1975-76 hunting seasons. This figure represents a 79% increase from the average of the 1964-65 and 1965-66 seasons (Table 1).

In Canada, all migratory game bird hunters are required to obtain Federal permits. Thus, in recent years their sampling methods have allowed woodcock harvest to be measured more accurately than in the United States. In 1975, 131,000 woodcock were harvested in Canada (Dobell 1976). Combining Canadian and U.S. harvest estimates indicates that the continental woodcock harvest exceeded 1.6 million birds during the 1975-76 hunting season.

Presently, two surveys, the wing-collection survey and the singing-ground survey, provide the best information available for establishing annual woodcock hunting regulations in the United States. The Service's woodcock wing-collection survey provides estimates of reproductive success during the previous breeding season, hunter success, and changes in size and distribution of the harvest. The cooperative U.S. and Canadian singing-ground survey provides an index to the size of the breeding population on principal breeding areas. This report presents data from the 1975-76 wing-collection survey, the 1976 singing-ground survey, and additional information accumulated since publication of the 1975 status report (Artmann 1977).

Present address: U.S. Fish and Wildlife Service, Federal Assistance, P.O. Box 25486, Federal Center, Denver, CO 80225.

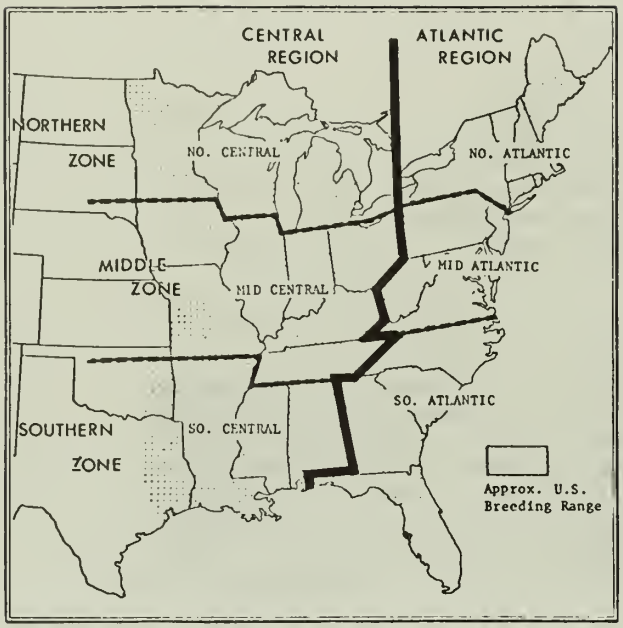

Fig. 1. The breeding range of the American woodcock divided into U.S. survey reference areas.

Wing-Collection Survey

Procedures

Procedures for collecting, processing, and analyzing wing-collection survey data have been described by Clark (1970, 1973). Survey participants were selected in a nonrandom manner from the following sources: (1) survey participants from the previous year; (2) woodcock hunters who responded to the Service's waterfowl hunter questionnaire or State harvest surveys; and (3) those who requested to be included in the survey. Clark (1972) discussed biases associated with selecting a survey sample from these sources; however, he asserted that major changes in productivity and hunting success could be determined from such a sample. For many analyses, only data from comparable hunters (hunters who have participated in the survey for two consecutive years) have been used. Some data also have been weighted to reflect differences in the number of participants and size of the harvest in various States (Clark 1970). Wing totals vary between tables in this report because incomplete information necessitated exclusion of some wings from various tabulations.

Table 1. *Comparison of changes in numbers of waterfowl hunters, number hunting woodcock, and their woodcock harvest. Data from the Waterfowl Hunter Questionnaire.*

Reference area	Waterfowl hunters in woodcock hunting States		Waterfowl hunters who hunted woodcock		Woodcock harvest by waterfowl hunters	
	Number[a]	% increase[b]	Number[a]	% increase[b]	Number[a]	% increase[b]
North Central	396,100	29.5	79,600	91.8	26,980	91.9
Mid-Central	302,900	89.9	19,800	120.0	57,400	105.0
South Central	349,700	42.0	19,200	48.8	94,600	34.6
Region total	1,048,700	47.6	118,600	87.1	421,800	76.6
North Atlantic	173,700	66.2	54,500	78.1	202,000	67.9
Mid-Atlantic	181,400	58.7	34,300	105.6	98,600	114.3
South Atlantic	86,800	23.5	8,300	84.4	33,800	85.7
Region total	441,900	52.9	97,100	89.3	334,400	81.2
Northern Zone	569,800	38.9	134,100	86.0	471,800	80.8
Mid-Zone	484,300	76.9	54,100	114.7	156,000	110.8
Southern Zone	436,500	37.9	27,500	58.0	128,400	45.1
U.S. total in woodcock range	1,490,600	49.0	215,700	88.1	756,200	78.6

[a] Average of the two latest hunting seasons for which data are available (final 1974-75 and preliminary 1975-76).
[b] Increase from the average of 1964-65 and 1965-66 hunting seasons.

Results

During the 1975-76 wing-collection survey, 9,130 woodcock hunters were contacted. Twenty-three percent responded and furnished data from one or more hunts. Wings were submitted from 21,440 woodcock. Hunter response rates have been consistently higher in northern States than in southern States (Table 2). To compensate for this difference and to improve the distribution of the wing sample, more hunters in mid-latitude and southern States have been contacted in recent years (Table 3). A State-by-State comparison of the number of cooperators, envelopes, and wings received during the 1974-75 hunting seasons is shown in Table 4.

Productivity Index

The ratio of immatures per adult female in the wing survey is used as an index to reproductive success during the preceding breeding season. Considerable variation in age ratios occurred among harvest areas (Table 5) and between hunting seasons for the same harvest areas (Table 6). In addition to sampling variance, variation may be caused by differences in hunting season dates, weather conditions, hunting restrictions, and possibly a combination of differential migration and hunting vulnerability. In an attempt to reduce some of this variation, only data from comparable hunters have been used in computing the weighted age ratios.

The 1975-76 rangewide productivity index decreased 13% from the 1974-75 index and 8% from the 11-year average (Table 6, Fig. 2). Generally, age ratios were lower across the northern tier of States (Fig. 3).

Separating the 1975-76 rangewide age ratio data into Regional components suggested that productivity decreased 10% in the Atlantic Region and 16% in the Central Region. Comparing Regional data from 1965 to 1975 revealed no significant trends in productivity. In both Regions the 1975-76 productivity index was below the long-term average; 2% in the Atlantic Region and 13% in the Central Region (Fig. 4).

Hunting Success Index

Based on rangewide data from comparable hunters, the daily hunting success index (average number of wings per envelope) decreased 3% between the 1974-75 and 1975-76 hunting season, whereas the seasonal hunting success index (average number of wings per cooperator) remained essentially constant (-1%; Table 7). Rangewide, daily hunting success

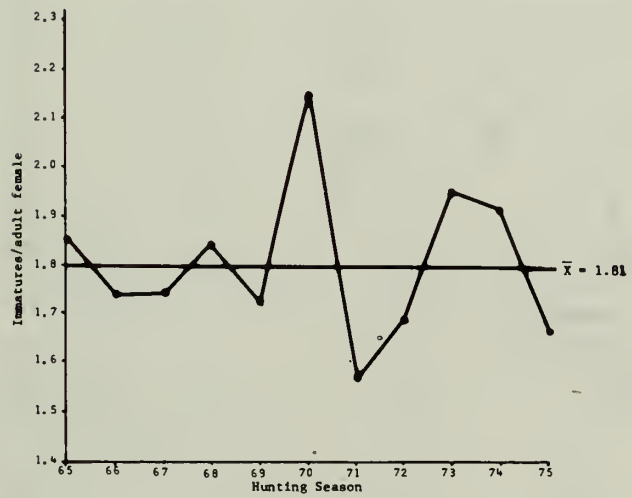

Fig. 2. Rangewide weighted age ratio indices (adjusted to base year 1969-70) determined from annual woodcock wing collections. Only data from cooperators who participated in the survey for 2 consecutive years were used.

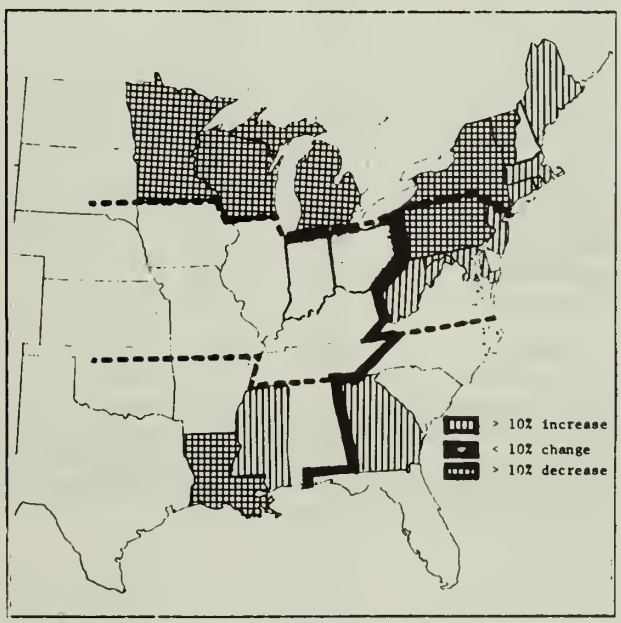

Fig. 3. Percentage change in weighted age ratios as determined from wing-collection data from cooperators who particpated in both the 1974-75 and 1975-76 surveys.

Table 2. *Distribution of contacts and response rates from the 1975-76 woodcock wing-collection survey (including code 4 contacts added during the hunting season).*

State of residence	Contact code[a]					Total contacted	No. of cooperators	Percentage of contacts responding
	1	2	4	8	9			
Alabama	13	62		6	2	83	15	6
Arkansas	5	46				51	7	14
Connecticut	125	254	11		32	422	99	23
Delaware	6	35	1		3	45	3	7
District of Columbia	1	0				1	0	0
Florida	8	75	1			84	7	8
Georgia	19	83	3	13	35	153	27	18
Illinois	25	137		4		166	32	19
Indiana	31	109			2	142	37	26
Iowa	7	87	1			95	17	18
Kansas	3	45				48	2	4
Kentucky	7	32	1		2	42	7	17
Louisiana	32	214	3		201	450	49	11
Maine	244	213	6	1	2	466	215	46
Maryland	25	0	2		231	258	24	9
Massachusetts	145	157	8		54	364	106	29
Michigan	153	0	13	54	796	1,016	255	25
Minnesota	64	175	1	1		241	68	28
Mississippi	15	1	1		774	791	12	2
Missouri	14	51	1	9	89	164	25	15
New Hampshire	63	176	3		11	253	89	35
New Jersey	160	111	19	29	118	437	140	32
New York	169	123	24	22	14	352	171	49
North Carolina	25	108	2	2	73	210	23	11
Ohio	47	235	3	18	6	309	76	25
Oklahoma	1	18				19	1	5
Pennsylvania	169	230	6		2	407	131	32
Rhode Island	37	66	1		4	108	27	25
South Carolina	19	81	10			110	23	21
Tennessee	4	39			490	533	49	9
Texas	5	46				51	7	14
Vermont	62	1			442	505	80	16
Virginia	21	80	5	4	44	154	38	25
West Virginia	13	32	1			46	21	46
Wisconsin	185	284	17	66	2	554	251	45
Total	1,922	3,406	144	229	3,429	9,130	2,134	23

[a] Code 1 - Previous year's Code 1, 2, 4, 7 and 8 hunters who submitted wings.
Code 2 - Waterfowl mail survey hunters who reported hunting woodcock.
Code 4 - Requested participation or referred by a fellow hunter.
Code 8 - Previous year's Code 9 hunters who submitted wings.
Code 9 - From a list provided by a State.

indices from 1965-75 showed a significant downward trend (r = -0.59), whereas seasonal hunting success for the same period does not have a significant trend (Fig. 5). However, seasonal data from 1967-75 indicated a downward trend. The reason for these declines is not known, but it probably is because of the expansion in the number of hunter contacts in mid-latitude and southern areas in recent years (Table 3). These hunters are generally less successful and their success varies widely between years, depending on the influence of weather on migration patterns.

Regional separation of 1975-76 daily hunting success data indicated lower (about 3%) indices in both Regions (Fig. 6). These indices were about 5% below the 1965-75 average and have significant downward trends. Although the 1975-76 seasonal hunting success index in the Atlantic Region decreased approximately 6%, it increased approximately 6% in the Central Region (Fig. 6). No statistically significant trends were indicated in either Region. However, since 1967 the Atlantic Region's seasonal hunting index has decreased; the 1975-76 index was 12% below the 1965-75 average. In contrast, the Central Region's index has increased since 1970 and the 1975-76 index was 7% above the previous 7-year average.

Another measure of hunting success was the size and distribution of daily bag information submitted by hunters. During the 1975-76 season, the percentage of hunts with daily bags larger than the 1971-75 season average was higher (Table 8). The north-central harvest area (Fig. 1) had the greatest percentage increase in the bag size of 5. In contrast, the mid-central harvest area had a slight decrease in larger daily bags and a corresponding increase in smaller bag sizes.

Chronology of Harvest

States with large wing samples provide indications of harvest and migration chronology. Data were summarized by 7-day periods, beginning with the opening hunting season date in each State from 1972-73 to 1975-76 (Tables 9 and 10). Hunter harvest varies even though the opening date is essentially the same, reflecting the influence of weather on migration, time of leaf fall, and hunter activity. However, when a large proportion of the harvest consistently occurs at the beginning or end of the hunting season, it indicates that hunting season dates could be adjusted accordingly to maximize hunting opportunity. In those States represented by small wing samples, information from other States at the same general latitude can be used to approximate the migration period.

Table 3. *Distribution of woodcock hunter contacts during the 1968-69, 1970-71, 1972-73, and 1975-76 hunting seasons.*

Reference area	Hunting season				% change between 1968-69 and 1975-76
	1968-69	1970-71	1972-73	1975-76	
North Central	1,894	1,757	1,061	1,811	-4
Mid-Central	542	721	795	1,499	+177
South Central	286	454	939	1,445	+405
Region total	2,722	2,932	2,795	4,755	+75
North Atlantic	2,836	2,304	2,982	2,470	-13
Mid-Atlantic	1,424	1,764	1,872	1,348	-5
South Atlantic	264	447	616	557	+111
Region total	4,524	4,515	5,470	4,375	-5
Northern Zone	4,730	4,061	4,043	4,281	-10
Mid-zone	1,966	2,485	2,667	2,847	+45
Southern Zone	550	901	1,555	2,002	+264
U.S. total	7,246	7,447	8,265	9,130	+26

Table 4. *Some results of the woodcock wing-collection survey during the 1974-75 and 1975-76 hunting seasons. Values from the 1973-74 hunting season are presented for comparison.*

State of residence	Number of cooperators		Number of envelopes received[a]		Number of wings received		Average number of wings per envelope			Average number of wings per cooperator		
	74-75	75-76	74-75	75-76	74-75	75-76	73-74	74-75	75-76	73-74	74-75	75-76
Alabama	19	15	55	61	62	76	1.6	1.1	1.2	5	3	5
Arkansas	5	7	24	10	46	16	1.5	1.9	1.6	9	9	2
Connecticut	129	112	479	399	778	517	1.8	1.6	1.3	7	6	5
Delaware	6	4	19	17	13	10	0.9	0.5	0.6	2	2	3
Florida	8	8	18	21	29	19	1.5	1.6	0.9	4	4	2
Georgia	33	28	104	108	216	229	2.3	2.1	2.1	7	7	8
Illinois	30	38	74	118	119	152	1.8	1.6	1.3	4	4	4
Indiana	34	39	130	151	171	223	1.3	1.3	1.5	5	5	6
Iowa	8	19	28	45	31	51	1.7	1.6	1.1	4	4	3
Kansas	3	2	4	4	1	0	0.0	0.3	0.0	0	0	0
Kentucky	8	7	23	24	31	47	1.7	1.3	2.0	5	4	7
Louisiana	33	49	187	267	386	592	2.1	2.1	2.2	7	12	12
Maine	252	217	1,635	1,313	3,787	3,059	2.6	2.3	2.3	16	15	14
Maryland	29	25	170	131	400	217	2.3	2.4	1.7	10	14	9
Massachusetts	147	143	736	698	1,425	1,372	2.0	1.9	2.0	11	10	10
Michigan	216	259	1,006	1,176	2,214	2,467	2.3	2.2	2.1	11	10	10
Minnesota	66	72	332	399	870	1,012	2.5	2.6	2.5	13	13	14
Mississippi	16	12	68	90	110	212	1.5	1.6	2.4	6	7	18
Missouri	25	26	49	58	70	61	1.6	1.4	1.2	2	3	3
New Hampshire	68	94	390	504	624	777	1.7	1.6	1.5	8	9	8
New Jersey	196	156	899	725	1,580	1,093	2.0	1.8	1.5	10	8	7
New York	203	173	1,124	1,099	2,289	2,248	2.1	2.0	2.0	11	11	13
North Carolina	28	24	75	62	140	87	1.6	1.9	1.4	5	5	4
Ohio	69	89	289	402	573	874	2.0	2.0	2.2	8	8	10
Oklahoma	1	1	4	3	3	11	1.0	0.8	3.7	1	3	11
Pennsylvania	175	133	555	488	867	760	2.0	1.6	1.6	7	5	6
Rhode Island	40	39	173	162	363	262	2.0	2.1	1.6	10	9	7
South Carolina	22	23	81	60	142	59	1.9	1.8	1.0	6	6	3
Tennessee	4	49	6	135	5	93	1.5	0.8	0.7	3	1	2
Texas	5	8	12	17	15	24	2.4	1.3	1.4	7	3	3
Vermont	64	80	486	478	943	884	2.1	1.9	1.8	14	15	11
Virginia	26	44	63	119	97	183	1.6	1.5	1.5	5	4	4
West Virginia	13	24	64	112	132	236	2.3	2.1	2.1	12	10	10
Wisconsin	257	252	1,202	1,346	2,634	2,918	2.1	2.2	2.2	10	10	12
Other	—	—	242	242	589	593	—	—	—	—	—	—
Total	2,238	2,271	10,806	11,044	21,754	21,440	2.1[b]	2.0[b]	1.9[b]	9.7[b]	9.7[b]	9.2[b]

[a]Includes envelopes submitted from hunts where no birds were bagged.
[b]Unweighted mean excludes information from the special study areas, and unknown contact codes.

Table 5. *Woodcock productivity by harvest area as indicated by the 1975-76 wing collection survey.*

Area of harvest	Age and sex categories								
	Adult			Immature			Unknown Age	Total wings Received[a]	Immatures per adult female[b]
	Male	Female	Unknown	Male	Female	Unknown			
Alabama	13	25	—	19	20	—	—	77	—
Arkansas	6	5	—	4	1	—	—	16	—
Connecticut	74	83	—	136	130	—	3	426	3.20
Delaware	5	—	—	4	—	—	—	9	—
Florida	3	4	—	3	6	—	—	16	—
Georgia	61	71	1	70	48	—	—	251	1.66
Illinois	16	14	—	33	23	—	—	86	—
Indiana	36	46	—	47	43	—	—	172	1.96
Iowa	9	14	—	7	7	—	—	37	—
Kentucky	8	6	—	15	5	—	—	34	—
Louisiana	103	159	—	177	180	1	—	620	2.25
Maine	750	1,072	6	992	811	5	2	3,638	1.69
Maryland	31	44	—	63	45	—	—	183	2.45
Massachusetts	154	217	—	201	168	—	1	741	1.70
Michigan	556	891	5	764	637	3	4	2,860	1.58
Minnesota	200	300	11	190	211	8	7	927	1.36
Mississippi	55	48	—	68	41	—	—	212	2.27
Missouri	10	20	—	18	14	—	—	62	—
New Brunswick	43	45	—	57	66	—	—	211	2.73
New Hampshire	196	374	—	270	236	—	—	1,076	1.35
New Jersey	132	199	—	314	234	—	—	879	2.75
New York	451	908	3	536	502	3	—	2,403	1.15
North Carolina	19	27	—	27	20	—	—	93	—
Ohio	157	188	—	181	151	1	—	678	1.77
Oklahoma	4	3	—	4	—	—	—	11	—
Pennsylvania	192	285	—	191	185	1	—	854	1.32
Rhode Island	16	20	1	29	27	—	—	93	—
South Carolina	8	16	—	18	20	—	—	62	—
Tennessee	24	23	—	24	22	—	—	93	—
Texas	8	9	—	—	4	—	—	21	—
Vermont	212	315	—	214	185	2	2	930	1.27
Virginia	33	36	—	43	31	—	2	145	2.06
West Virginia	24	61	—	52	40	—	1	178	1.51
Wisconsin	625	1,047	2	723	678	1	2	3,078	1.34
Total	4,234	6,575	29	5,494	4,791	25	24	21,172	1.57

[a]Excluding wings from special study areas.
[b]Unweighted data from harvest areas represented by at least 100 wings.

Table 6. *Indices of productivity as indicated by the ratio of adult female to immature woodcock received from cooperators who participated in the 1974-75 and 1975-76 surveys.*

Area of harvest	Proportion of total kill (weighting factor)	Number of wings received		Adult females		Immatures		Immatures per adult female[a]	
		1974-75	1975-76	1974-75	1975-76	1974-75	1975-76	1974-75	1975-76
Alabama		31	55	—	—	11	28	—	—
Arkansas		41	12	—	—	18	4	—	—
Connecticut[b]	0.0212	520	325	125	63	315	201	2.52	3.19
Delaware		2	1	—	—	1	—	—	—
Florida		14	3	—	—	7	—	—	—
Georgia[b]	0.0474	165	162	63	45	54	79	0.86	1.76
Illinois		46	35	—	—	29	20	—	—
Indiana		69	95	19	23	37	48	1.95	2.09
Iowa		21	10	—	—	7	4	—	—
Iowa				—	—	—	—	—	—
Kentucky		18	22	—	—	9	16	—	—
Louisiana[b]	0.0378	362	377	78	89	257	228	3.29	2.56
Maine[b]	0.0981	3,782	3,178	1,238	944	1,642	1,566	1.33	1.66
Maryland[b]		231	142	70	38	109	83	1.56	2.18
Massachusetts[b]	0.0316	551	567	187	170	238	282	1.27	1.66
Michigan[b]	0.2187	2,123	2,179	601	680	1,057	1,061	1.76	1.56
Minnesota	0.0143	738	825	206	269	382	358	1.85	1.33
Mississippi		88	177	40	41	35	86	0.88	2.10
Missouri		24	27	—	—	6	12	—	—
New Brunswick		146	164	36	33	79	102	2.19	3.09
New Hampshire[b]	0.0238	741	709	228	230	341	345	1.50	1.50
New Jersey[b]	0.0434	950	726	207	155	567	472	2.74	3.05
New York[b]	0.1372	2,199	2,198	689	813	1,013	966	1.47	1.19
North Carolina		85	44	—	—	50	20	—	—
Ohio[b]	0.0475	353	442	103	134	150	201	1.46	1.50
Pennsylvania[b]	0.1639	737	715	177	241	418	321	2.36	1.33
Rhode Island		103	65	22	12	63	39	2.86	3.25
South Carolina		69	24	—	—	26	19	—	—
Tennessee		1	1	—	—	—	1	—	—
Texas		9	10	—	—	6	2	—	—
Vermont[b]	0.0301	822	714	233	231	426	323	1.83	1.40
Virginia		57	54	—	—	29	32	—	—
West Virginia		97	63	31	18	41	36	1.32	2.00
Wisconsin[b]	0.0843	2,540	2,725	701	914	1,373	1,258	1.96	1.38
Total and weighted age ratio[b]		17,735	16,846	5,174	5,229	8,796	8,213	1.83	1.60
Change in weighted age ratio									-12.60%

[a]Computed only for harvest areas (states) represented by at least 150 wings in the 2 years.
[b]Weighted age ratios for the sum of the products of state age ratios multiplied by their weighting factors.

Table 7. *Indices of woodcock hunting success as indicated by the number of wings received from cooperators who participated in both 1974-75 and 1975-76 wing-collection surveys.*

State of residence	Weight factor	Number who cooperated both years	Number of envelopes		Number of wings		Average number wings per envelope		Average number wings per cooperator[a]	
			1974-75	1975-76	1974-75	1975-76	1974-76-75	1975-76	1974-75	1975-76
Alabama		6	23	34	31	55	1.3	1.6	—	—
Arkansas		2	18	5	41	12	2.3	2.4	—	—
Connecticut[b]	0.0223	50	216	172	471	304	2.2	1.8	9.4	6.1
Delaware		1	1	1	2	1	2.0	1.0	—	—
Florida		1	8	3	14	3	1.8	1.0	—	—
Georgia[b]		11	56	64	154	145	2.8	2.3	14.0	13.2
Illinois		9	24	20	45	29	1.9	1.5	—	—
Indiana		13	39	48	63	95	1.6	2.0	4.8	7.3
Iowa		2	8	5	17	10	2.1	2.0	—	—
Kentucky		4	10	11	18	22	1.8	2.0	—	—
Louisiana[b]	0.0397	20	134	146	321	351	2.4	2.4	16.1	17.6
Maine[b]	0.1030	142	1,108	980	3,053	2,643	2.8	2.7	21.5	18.6
Maryland		9	84	63	227	139	2.7	2.2	—	—
Massachusetts[b]	0.0332	65	240	236	452	451	1.9	1.9	7.0	6.9
Michigan[b]	0.2296	125	687	730	1,853	1,860	2.7	2.5	14.8	14.9
Minnesota[b]	0.0150	38	239	233	694	758	2.9	3.3	18.3	19.9
Mississippi		6	42	65	88	177	2.1	2.7	—	—
Missouri		7	11	14	23	26	2.1	1.9	—	—
New Hampshire[b]	0.0250	34	188	173	408	407	2.2	2.4	12.0	12.0
New Jersey[b]	0.0455	85	410	316	897	624	2.2	2.0	10.6	7.3
New York[b]	0.1441	125	762	795	1,944	2,014	2.6	2.5	15.6	16.1
North Carolina[b]		9	31	21	79	38	2.5	1.8	—	—
Ohio[b]	0.0499	28	128	156	348	426	2.7	2.7	12.4	15.2
Pennsylvania[b]	0.1721	76	265	282	578	608	2.2	2.2	7.6	8.0
Rhode Island		11	46	36	98	62	2.1	1.7	8.9	5.6
South Carolina		7	38	17	69	21	1.8	1.2	—	—
Tennessee		1	1	1	1	1	1.0	1.0	—	—
Texas		2	7	6	9	10	1.3	1.7	—	—
Vermont[b]	0.0316	35	320	271	743	612	2.3	2.3	21.2	17.5
Virginia[b]		12	27	29	57	54	2.1	1.9	4.8	4.5
West Virginia		4	31	22	77	48	2.5	2.2	—	—
Wisconsin[b]	0.0885	157	859	920	2,289	2,474	2.7	2.7	14.6	15.8
Total and weighted average[b]		1,097	6,061	5,875	15,164	14,480	2.5	2.4	13.9	13.7

[a]Computed only for states represented by at least 10 hunters who cooperated both years.

[b]The weighted average is the sum of the products of state averages multiplied by their weighting factors using only states represented by at least 15 hunters who cooperated both years.

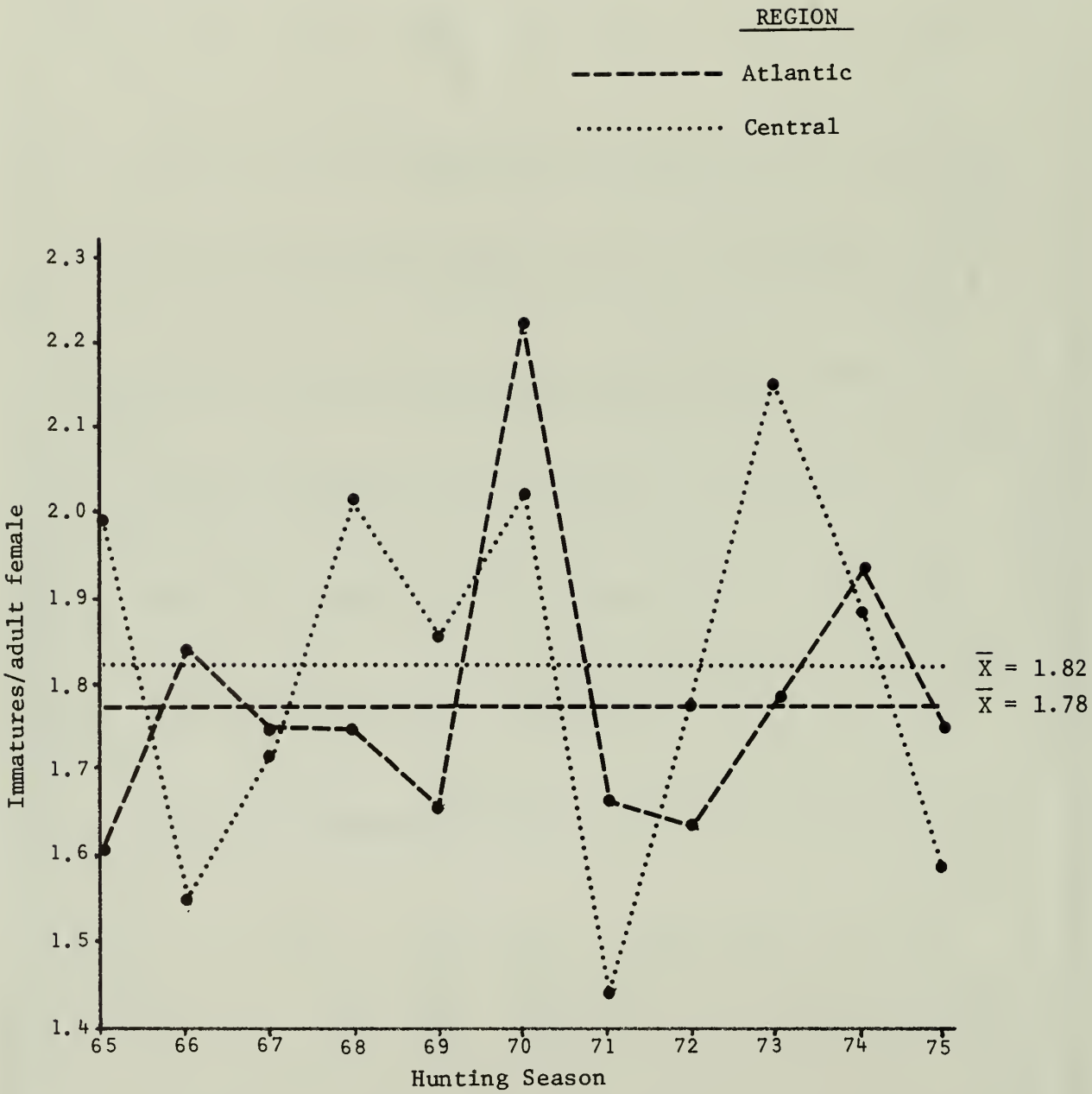

Fig. 4. Regional weighted age ratios indices (adjusted to base year 1969-70) determined from annual woodcock wing collections. Only data from cooperators who participated in the survey for 2 consecutive years were used.

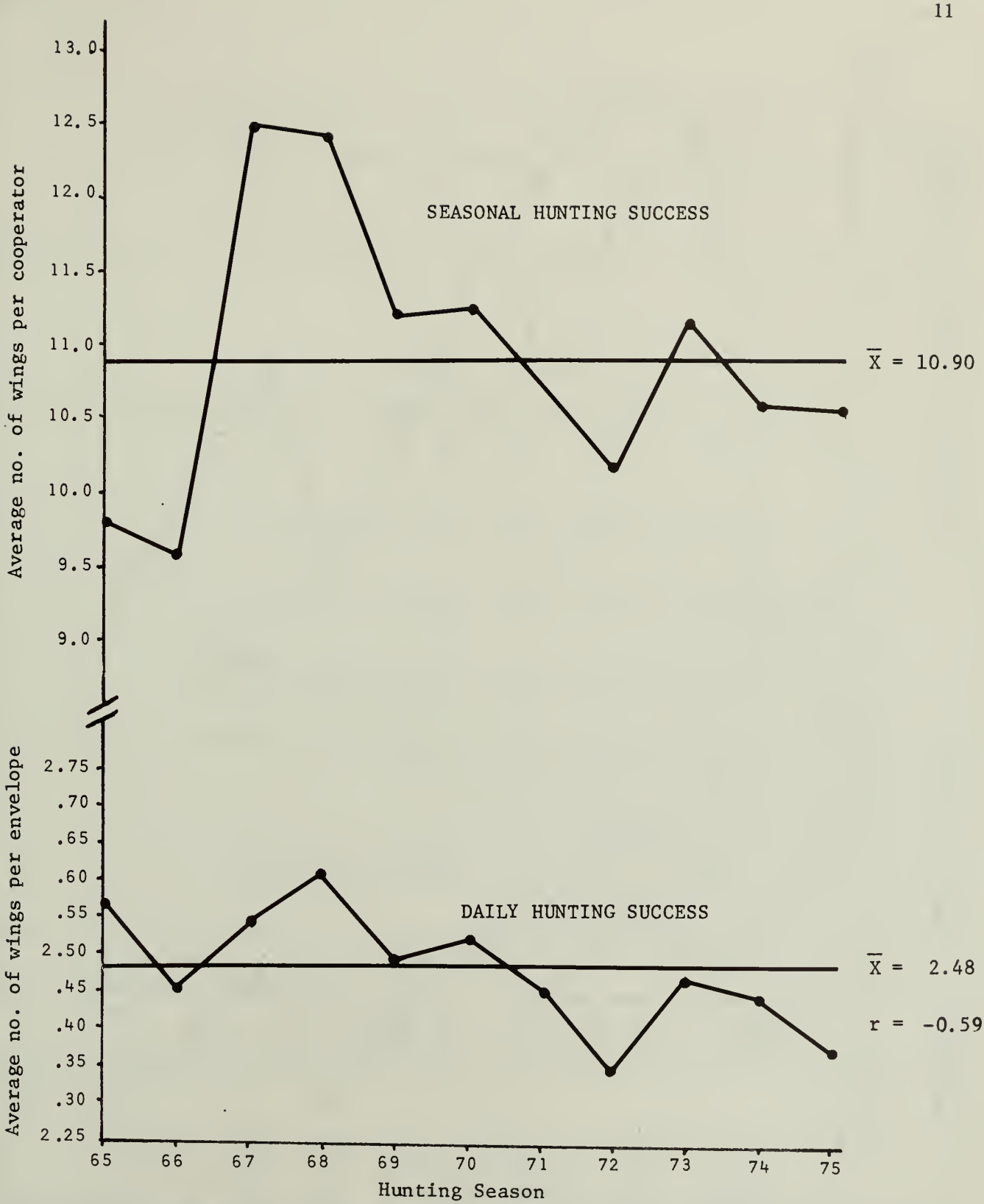

Fig. 5. Rangewide weighted daily and seasonal hunting success (adjusted to base year 1969-70) determined from woodcock wing collection. Only data from cooperators who participated in the survey for 2 consecutive years were used.

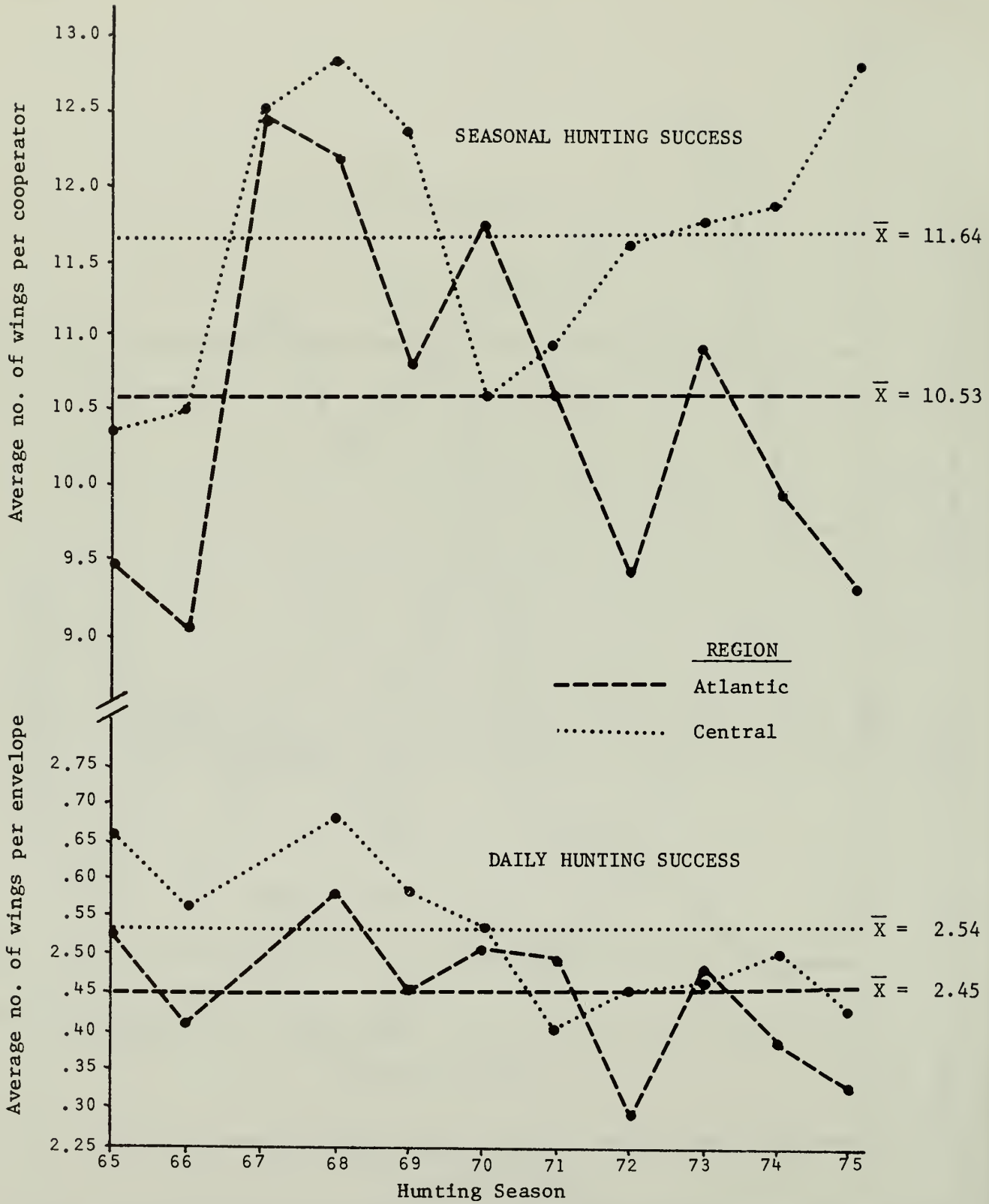

Fig. 6. Regional weighted daily and seasonal hunting success indices (adjusted to base year 1969-70) determined from woodcock wing collection. Only data from cooperators who participated in the survey for 2 consecutive years were used.

Table 8. *Distribution of daily bag sizes in woodcock wing collection by harvest areas 1975-76 and 1971-72 through 1975-76 seasons.*

Harvest area	Year	Bag size										Total successful hunts
		1		2		3		4		5		
		No.	%	No.	%	No.	%	No.	%	No.	%	
North Central	1975-76	899	34.5	550	21.1	332	12.8	290	11.1	532	20.4	2,603
	1971-76	857	40.2	490	22.9	328	15.4	171	7.3	323	13.9	2,169
Mid-Central	1975-76	271	48.8	122	22.0	66	11.9	34	6.1	62	11.2	555
	1971-76	175	52.4	74	21.9	43	12.8	16	4.4	30	8.2	338
South Central	1975-76	164	39.9	93	22.6	62	15.1	40	9.7	52	12.7	411
	1971-76	165	48.1	80	23.0	49	13.7	22	5.6	36	9.5	352
Central total	1975-76	1,334	37.4	765	21.4	460	12.9	364	10.2	646	18.1	3,569
	1971-76	1,197	42.5	644	22.8	420	15.0	209	6.8	389	12.7	2,859
North Atlantic	1975-76	1,513	38.7	891	22.8	608	15.5	359	9.2	542	13.9	3,913
	1971-76	1,527	40.4	908	24.0	608	16.0	310	7.7	469	11.8	3,822
Mid-Atlantic	1975-76	533	48.2	268	24.2	141	12.7	66	6.0	98	8.9	1,106
	1971-76	579	46.6	292	23.4	170	13.5	88	6.6	132	9.7	1,261
South Atlantic	1975-76	110	52.1	44	20.9	25	11.8	11	5.2	21	10.0	211
	1971-76	143	56.6	54	21.3	29	11.5	11	4.3	16	6.1	253
Atlantic total	1975-76	2,156	41.2	1,203	23.0	774	14.8	436	8.3	661	12.6	5,230
	1971-76	2,249	42.6	1,254	23.7	807	15.2	409	7.3	616	11.0	5,335
U.S. total	1975-76	3,490	39.7	1,968	22.4	1,234	14.0	800	9.1	1,307	14.9	8,799
	1971-76	3,447	42.5	1,898	23.4	1,227	15.1	618	7.2	1,005	11.7	8,195

Table 9. *Distribution of 1972-73 through 1975-76 wing collections by 7-day periods[a]—Atlantic Region. (T=less than 1%)*

State	Year	Season opening date	Sample size	Percentage of harvest in single period										Percentage of harvest in combined periods		
				1	2	3	4	5	6	7	8	9	10	1&2	3-6	7-10
Connecticut	1972-73	10-21	610	29	26	26	11	6	3	T	—	—	—	55	44	T
	1973-74	10-20	759	19	16	24	17	12	7	2	1	—	—	35	61	3
	1974-75	10-19	661	25	21	27	13	11	3	T	T	—	—	46	54	T
	1975-76	10-18	421	21	11	21	21	12	8	4	1	T	—	32	62	5
Delaware	1972-73	9-30	13	—	—	8	23	—	15	15	31	8	—	—	46	54
	1973-74	10-17	14	—	7	50	—	14	21	7	—	—	—	7	86	7
	1974-75	10-21	10	10	—	—	—	80	—	10	—	—	—	10	90	—
	1975-76	10-18	9	—	—	—	—	78	11	—	—	—	11	—	89	11
Florida	1972-73	11-11	47	—	11	26	23	—	6	23	9	2	—	11	55	34
	1973-74	11-10	37	—	11	3	5	11	14	24	16	5	8	14	54	31
	1974-75	12-21	17	71	12	12	—	—	—	6	—	—	—	83	12	6
	1975-76	12-20	15	20	7	—	—	—	47	—	13	13	—	27	47	26
Georgia	1972-73	11-20	143	13	10	11	4	7	22	11	5	12	4	23	45	32
	1973-74	11-20	224	12	15	20	11	7	12	5	13	3	T	27	50	23
	1974-75	11-20	249	15	15	22	9	11	2	11	10	3	3	30	44	27
	1975-76	11-20	251	18	7	4	9	17	4	6	9	19	5	25	34	39
Maine	1972-73	9-25	3,715	2	19	26	30	15	7	1	T	—	—	20	79	1
	1973-74	9-24	4,423	2	13	25	24	23	8	2	2	T	T	15	81	4
	1974-75	9-23	4,664	10	10	21	22	24	11	1	T	T	T	20	78	2
	1975-76	9-24	3,606	1	21	25	21	16	9	5	1	T	—	22	71	6
Maryland	1972-73	10-5	115	9	2	18	8	20	12	19	7	3	3	10	58	31
	1973-74	10-5	213	7	7	10	10	15	9	17	12	9	2	13	46	40
	1974-75	10-5	308	3	4	12	16	18	11	13	14	7	3	7	57	37
	1975-76	10-4	183	14	4	14	13	15	15	7	9	7	2	18	57	25
Massachusetts	1972-73	10-10	898	42	28	13	11	5	1	T	—	—	—	70	30	—
	1973-74	10-10	1,100	35	23	12	13	9	5	2	T	—	—	58	39	2
	1974-75	10-10	731	37	20	20	16	4	2	T	T	—	—	57	42	T
	1975-76	10-10	733	27	27	17	13	10	6	T	T	—	—	54	46	T
New Hampshire	1972-73	10-1	879	26	28	24	14	7	2	—	—	—	—	53	47	—
	1973-74	10-1	938	27	19	22	21	8	2	T	—	—	—	46	53	T
	1974-75	10-1	985	31	19	21	21	6	T	T	—	T	—	50	49	T
	1975-76	9-27	1,070	22	18	18	19	18	2	T	T	T	T	40	57	T
New Jersey	1972-73	10-14	897	12	16	16	15	12	12	7	2	5	2	28	56	16
	1973-74	10-13	1,591	7	10	13	19	19	16	9	5	T	T	17	66	15
	1974-75	10-12	1,269	8	18	20	18	12	9	5	4	2	3	26	59	15
	1975-76	10-11	865	10	10	14	17	15	13	9	5	3	5	20	59	22

Table 9. —Continued.

State	Year	Season opening date	Sample size	Percentage of harvest in single period										Percentage of harvest in combined periods		
				1	2	3	4	5	6	7	8	9	10	1&2	3-6	7-10
New York	1972-73	9-20	1,966	3	8	17	21	15	13	14	8	1	T	11	66	23
	1973-74	9-20	2,601	5	8	16	14	24	16	12	3	2	T	13	70	17
	1974-75	9-20	2,480	4	9	19	17	25	15	6	4	1	T	13	76	11
	1975-76		2,392	4	11	15	17	20	16	8	5	2	T	15	68	16
North Carolina	1972-73	12-9	185	17	16	22	10	3	8	3	8	6	3	33	42	25
	1973-74	12-8	126	10	16	16	6	12	5	19	7	4	2	27	39	33
	1974-75	12-6	128	15	6	15	17	3	7	5	8	8	17	21	42	38
	1975-76	11-22	93	12	5	11	10	8	25	5	3	11	8	17	54	27
Pennsylvania	1972-73	10-14	1,051	40	25	13	13	7	1	T	T	—	—	65	34	T
	1973-74	10-13	1,161	32	20	20	20	5	2	T	—	—	—	51	48	T
	1974-75	10-12	987	17	31	18	21	8	4	T	—	—	—	48	51	T
	1975-76	10-11	841	26	20	22	16	10	5	1	T	T	—	46	53	1
Rhode Island	1972-73	10-21	113	36	20	25	11	3	1	2	3	—	—	57	39	4
	1973-74	10-20	167	24	18	28	16	9	5	T	T	—	—	42	57	T
	1974-75	10-19	132	40	16	15	20	6	—	—	—	2	T	56	41	3
	1975-76	10-18	93	39	23	11	8	1	12	4	2	1	—	62	32	7
South Carolina	1972-73	12-26	127	11	17	16	5	7	6	4	17	17	1	28	33	39
	1973-74	12-26	151	25	15	5	7	8	14	8	8	8	3	40	33	27
	1974-75	12-20	134	14	10	10	12	7	6	9	17	8	7	24	35	41
	1975-76	11-27	61	20	12	7	8	10	18	8	12	7	—	32	43	27
Vermont	1972-73	9-30	675	22	22	27	18	9	3	T	—	—	—	44	56	T
	1973-74	9-29	1,042	16	17	27	23	12	5	T	—	—	—	33	67	T
	1974-75	9-28	945	18	23	17	22	13	5	2	T	—	—	41	57	2
	1975-76	9-27	914	20	22	17	21	13	6	2	T	—	—	42	57	2
Virginia	1972-73	11-13	89	20	17	3	4	1	2	13	18	16	5	37	11	52
	1973-74	10-15	162	2	3	2	10	25	19	10	12	11	2	6	56	36
	1974-75	11-1	83	33	13	11	14	4	17	7	1	—	—	46	46	8
	1975-76	10-31	145	37	22	10	10	4	9	3	1	T	3	59	33	7
West Virginia	1972-73	10-14	208	10	20	16	38	12	4	—	—	—	—	30	70	—
	1973-74	10-13	251	14	11	22	24	14	6	5	6	—	—	25	66	9
	1974-75	10-12	138	17	21	22	14	21	5	—	—	—	—	38	62	—
	1975-76	10-11	178	15	15	22	17	16	8	4	2	T	—	30	63	6

[a]First period begins on season opening date.

Table 10. *Distribution of 1972-73 through 1975-76 wing collections by 7-day periods[a]—Central Region (T = less than 1%)*

State	Year	Season opening date	Sample size	Percentage of harvest in single period										Percentage of harvest in combined periods		
				1	2	3	4	5	6	7	8	9	10	1&2	3-6	7-10
Alabama	1972-73	12-26	49	18	12	10	12	12	8	10	14	2	—	31	43	27
	1973-74	12-26	74	8	1	26	24	8	3	8	12	7	3	9	61	30
	1974-75	12-26	65	9	14	9	6	8	14	20	12	6	2	23	37	40
	1975-76	11-28	71	30	18	13	6	3	10	3	10	7	1	48	32	21
Arkansas	1972-73	12-1	28	—	4	4	11	7	4	18	25	29	—	4	25	71
	1973-74	12-1	34	6	9	18	24	3	9	12	12	9	—	15	53	32
	1974-75	12-1	53	11	4	6	6	11	—	4	13	26	18	15	23	61
	1975-76	12-1	16	56	13	—	—	—	—	6	—	25	—	69	—	31
Illinois	1972-73	10-15	37	27	24	3	30	11	3	3	—	—	—	51	46	3
	1973-74	10-15	24	46	25	4	8	17	—	—	—	—	—	71	29	0
	1974-75	10-15	74	23	8	12	27	28	1	—	—	—	—	31	68	—
	1975-76	10-15	83	2	8	2	4	18	36	10	5	7	7	10	60	29
Indiana	1972-73	9-23	98	9	6	7	1	7	26	20	23	—	—	15	41	44
	1973-74	9-22	45	20	4	4	13	29	7	17	4	4	—	24	53	23
	1974-75	9-28	97	19	3	20	15	8	8	26	1	—	—	22	51	27
	1975-76	9-20	172	9	5	3	6	12	23	18	11	5	8	14	44	42
Iowa	1972-73	10-21	2	100	—	—	—	—	—	—	—	—	—	100	—	—
	1973-74	9-22	13	23	—	—	—	15	8	54	—	—	—	23	23	54
	1974-75	9-21	26	12	12	—	—	50	23	—	—	4	—	24	73	4
	1975-76	9-13	20	15	20	20	15	25	5	—	—	—	—	35	65	—
Kentucky	1972-73	11-16	10	60	30	10	—	—	—	—	—	—	—	90	10	—
	1973-74	10-15	27	—	—	—	—	—	15	52	33	—	—	—	15	85
	1974-75	10-15	31	—	—	—	—	—	65	16	19	—	—	—	65	35
	1975-76	10-10	34	—	—	—	—	—	—	—	38	62	—	—	—	100
Louisiana	1972-73	12-9	730	15	16	21	10	6	13	9	5	2	3	31	50	19
	1973-74	12-8	448	10	10	12	20	13	12	10	8	5	T	20	56	23
	1974-75	12-7	402	22	17	16	10	9	11	4	4	3	3	39	46	14
	1975-76	12-6	616	5	7	10	12	14	14	12	11	9	6	12	50	38
Michigan	1972-73	9-15	1,994	17	9	17	17	18	10	7	4	2	—	26	61	13
	1973-74	9-15	2,568	14	13	15	16	14	15	8	4	1	T	26	61	13
	1974-75	9-15	2,505	21	14	13	19	17	12	3	1	T	—	35	61	4
	1975-76	9-15	2,829	17	13	14	17	17	13	5	3	1	—	30	61	9
Minnesota	1972-73	9-1	542	8	8	8	5	10	21	23	13	4	1	16	44	40
	1973-74	9-1	765	5	7	9	9	13	17	9	6	1	T	11	49	40
	1974-75	9-7	802	9	5	11	13	15	28	16	4	T	T	14	67	20
	1975-76	9-1	926	7	8	7	11	9	18	18	15	5	4	15	45	42

Table 10. Continued

State	Year	Season opening date	Sample size	Percentage of harvest in single period										Percentage of harvest in combined periods		
				1	2	3	4	5	6	7	8	9	10	1&2	3-6	7-10
Mississippi	1972-73	12-18	195	34	19	6	4	3	3	7	14	7	4	53	15	32
	1973-74	12-15	133	13	13	11	5	6	6	12	8	23	4	26	28	47
	1974-75	12-14	109	22	20	15	10	4	9	3	6	8	3	42	38	20
	1975-76	12-13	212	14	10	19	6	9	9	17	11	4	2	24	43	34
Missouri	1972-73	10-1	24	8	—	12	—	29	—	29	21	—	—	8	42	50
	1973-74	10-1	27	—	—	—	26	—	19	19	4	33	—	0	44	56
	1974-75	10-1	44	2	—	9	7	20	18	39	2	2	—	2	55	43
	1975-76	10-1	60	—	—	2	3	12	25	35	20	2	2	—	42	59
Ohio	1972-73	9-15	413	8	8	10	14	18	11	12	14	5	T	15	53	32
	1973-74	9-17	376	16	5	6	9	17	14	17	13	2	3	21	45	33
	1974-75	9-14	419	3	5	5	6	13	20	21	18	6	4	8	44	49
	1975-76	9-12	678	8	8	10	16	15	13	14	6	7	3	16	54	30
Oklahoma	1972-73	11-20	4	75	25	—	—	—	—	—	—	—	—	100	—	—
	1973-74	11-20	1	—	100	—	—	—	—	—	—	—	—	100	—	—
	1974-75	11-20	3	—	33	—	—	67	—	—	—	—	—	33	67	—
	1975-76	11-20	11	100	—	—	—	—	—	—	—	—	—	100	—	—
Tennessee	1972-73	11-18	13	54	15	—	—	—	15	—	8	—	8	69	15	15
	1973-74	11-22	35	14	9	6	14	20	3	—	—	—	34	23	43	34
	1974-75	10-12	3	—	—	—	33	—	—	33	—	—	33	—	33	67
	1975-76	9-27	92	4	4	1	5	13	15	24	17	12	3	8	34	56
Texas	1972-73	11-18	18	—	11	11	—	11	39	28	—	—	—	11	61	28
	1973-74	11-17	59	—	7	2	8	27	24	19	2	3	8	7	61	32
	1974-75	11-16	13	7	—	15	23	8	—	23	—	15	8	7	46	46
	1975-76	11-15	20	5	5	5	25	5	10	30	—	—	5	10	45	35
Wisconsin	1972-73	9-16	2,328	8	5	17	17	24	13	10	5	1	T	13	71	16
	1973-74	9-15	2,729	9	8	18	18	20	15	9	3	3	1	17	70	13
	1974-75	9-14	2,855	10	9	15	20	25	15	5	2	T	T	19	75	7
	1975-76	9-13	3,050	7	6	8	17	21	16	14	7	4	T	13	62	25

[a]First period begins on season opening date.

Singing-Ground Survey

Procedures

The spring singing-ground survey, which involves counts of displaying males heard along predetermined routes, is interpreted as an index to the size of an area's resident breeding woodcock population. Before 1964, "management routes" were established in areas known to support woodcock. From 1964 to 1970, the survey was shifted gradually to routes located randomly throughout the major breeding range. Since 1970, the breeding population index has been based solely on "random routes," which provide better statistical reliability. In computing the breeding index, data from States and Provinces were weighted by land area (inland water area excluded) within the range of the species (Clark 1970).

Routes where woodcock have not been heard for two consecutive years, under similar circumstances, are placed in the "Constant O" group. They are included in comparable route calculations annually, but are field-checked only at 5-year intervals until woodcock are heard again.

Since paired routes may not be the same in consecutive years it is meaningless to present numbers of singing birds heard per route. Similarly, conversion to random routes, which have averaged fewer birds than management routes, also precludes comparing the average number of birds heard per route. In order to compare the results, the data were adjusted by the percentage change in numbers of birds heard between years, with 1970 as the base year (Clark 1973).

Results

During 1976, the number of woodcock heard rangewide along 954 comparable routes increased 2.8% (Table 11). Separating the data into Regional components showed that the Atlantic Region breeding population index (BPI) decreased 1.5%, while the Central Region's increased 5.8% (Fig. 7). The decrease in the Atlantic Region's BPI continued the general decrease apparent since 1967; the 1976 index was 14% below the 1964-76 average (Fig. 8). A regression model indicated an annual rate of decrease of 2% per year in the Atlantic Region ($P < 0.01$). In contrast, the Central Region's BPI decreased before 1969, but since then has exhibited a general upward trend ($P < 0.05$); the 1976 index was about 15% above the 1964-76 average.

Relative woodcock densities are shown by geographical area in Fig. 9. Highest densities were

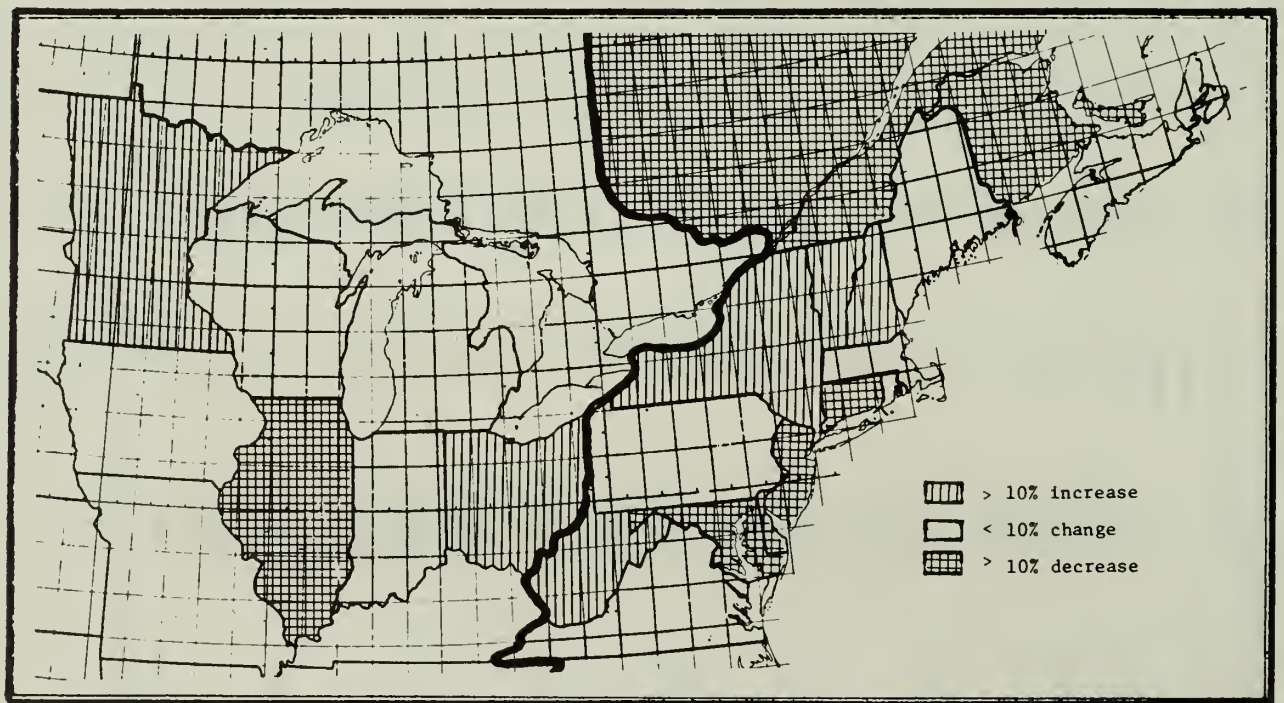

Fig. 7. Percentage change in woodcock breeding population indices as indicated by the singing-ground surveys in 1975 and 1976.

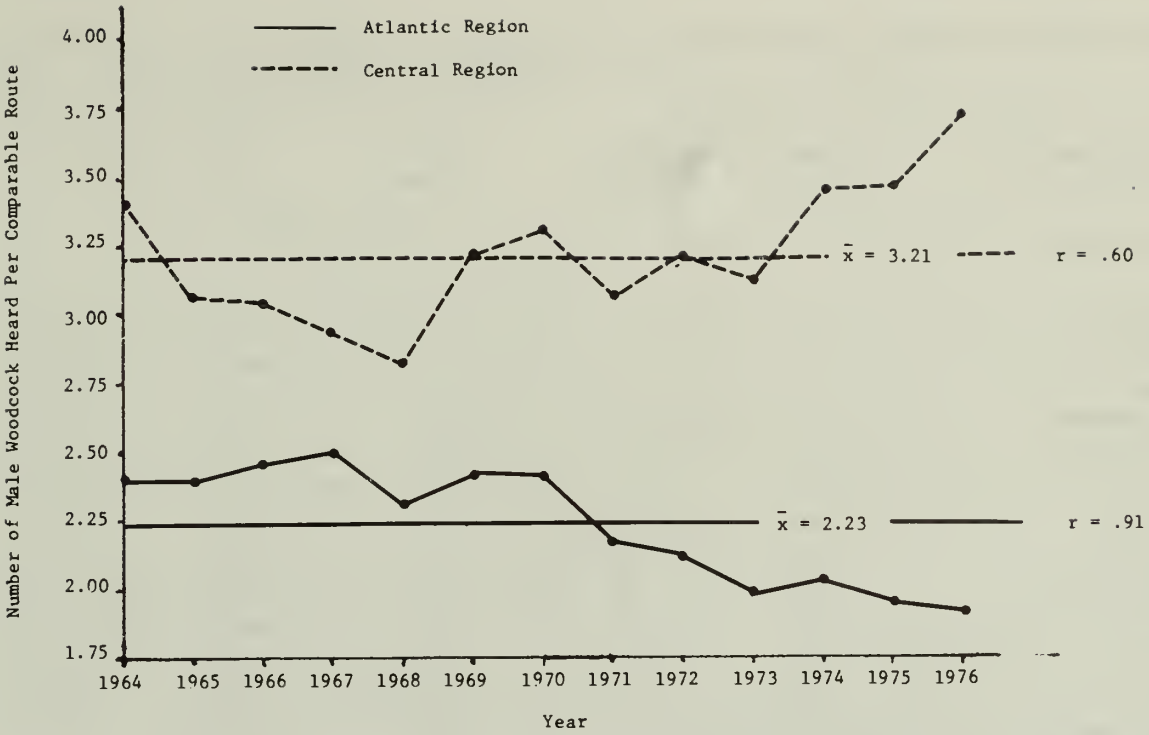

Fig. 8. Regional trends in the woodcock breeding population index as determined by singing-ground surveys. Data adjusted to base year 1970.

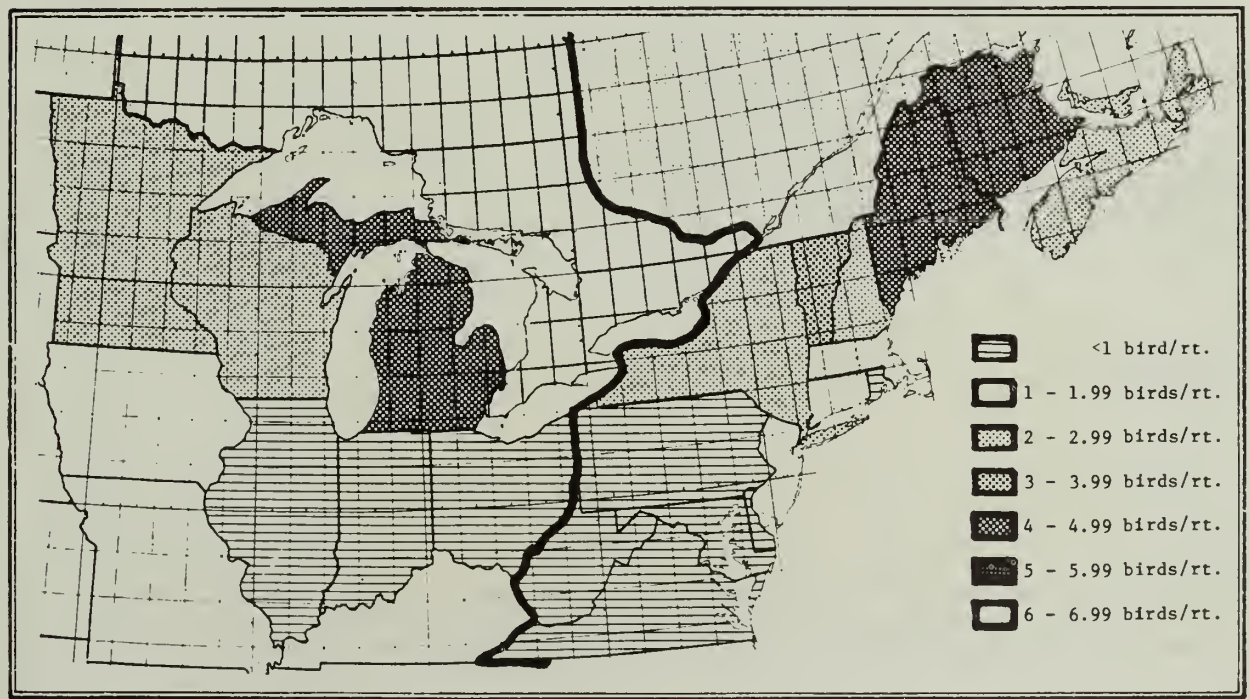

Fig. 9. Relative woodcock densities as determined by the 1976 singing-ground survey.

Table 11. *Woodcock breeding population indexes as indicated by singing-ground surveys in 1975 and 1976 (random routes only).*

State or Province	Number of routes censused		Comparable routes[a]	Woodcock heard per comparable route	
	1975	1976		1975	1976
Atlantic Region					
Connecticut	9	8	11	2.45	1.09
Delaware	2	2	3	1.67	0.00
Maine	50	50	36	4.89	4.42
Maryland	15	16	17	0.76	0.53
Massachusetts	15	16	13	1.69	1.69
New Brunswick	61	57	47	5.77	5.17
New Hampshire	16	14	9	1.67	2.67
New Jersey	13	14	9	1.89	1.44
New York	66	70	65	1.98	2.41
Nova Scotia	43	35	31	1.94	2.00
Pennsylvania	37	46	61	0.88	0.90
Prince Edward Island	8	8	11	4.09	2.54
Quebec	33	23	14	2.07	1.71
Rhode Island	2	3	4	0.50	0.50
Vermont	21	18	16	2.88	3.19
Virginia	20	34	75	0.49	0.53
West Virginia	24	52	39	0.62	0.82
Regional total & weighted average[b]	435	466	461	2.15	2.11
Regional index change					-1.50%
Central Region					
Illinois	52	58	59	0.10	0.07
Indiana	25	42	60	0.32	0.32
Michigan	111	102	88	4.30	4.07
Minnesota	80	75	79	2.14	2.94
Ohio	37	34	77	0.75	1.08
Ontario	51	62	33	6.00	6.15
Wisconsin	79	84	97	2.39	2.34
Regional total & weighted average[b]	435	457	493	3.29	3.48
Regional index change					+5.82%
Rangewide total & weighted average[b]	870	923	954	2.69	2.77
Rangewide index change					+2.78%

[a] Includes routes carried as constant zero routes.

[b] Weighted averages are sums of products of woodcock heard per comparable route and the corresponding State or Province percentage of the total land area sampled. States or Provinces excluded where one comparable route represents more than 5.180 km^2 (2,000 square miles) or where the number heard per route is less than 0.5.

recorded in the northern States and southern portions of the Provinces. Generally, areas south of 42° latitude had fewer than one woodcock heard per route.

Acknowledgments

Most data in this report would not be available without the cooperation of the Canadian Wildlife Service, Provincial and State conservation departments, U.S. Fish and Wildlife Service personnel of Regions 3, 4, and 5, and the many individuals who assisted in the surveys. Special recognition is extended to K. Munson for help in preparing the report, R. Hines for the cover sketch, and T. Dwyer, R. Pospahala, and L. Schroeder for reviewing the manuscript.

Special thanks are extended to the biologists who helped process nearly 22,000 woodcock wings. These cooperators and the affiliations are as follows:

G. Carowan	U.S. Fish and Wildlife Service
P. Corr	Maine Department of Inland Fisheries and Game
W. Cottrell	Maryland Department of Natural Resources
K. D'Loughy	Maryland Department of Natural Resources
B. Dorf	Maryland Department of Natural Resources
G. Gard	U.S. Fish and Wildlife Service
D. Langowski	U.S. Fish and Wildlife Service
B. Larned	Maryland Department of Natural Resources
T. Mathews	Maryland Department of Natural Resources
R. McKee	Maryland Department of Natural Resources
C. Mohlis	U.S. Fish and Wildlife Service
C. Nicholson	University of Maine
H. R. Perry, Jr.	U.S. Fish and Wildlife Service
T. Prickett	Louisiana Wildlife and Fisheries Commission
M. Rubala	Maryland Department of Natural Resources
F. Simms	U.S. Fish and Wildlife Service
B. Sonderricker	Maryland Department of Natural Resources
S. Stenquist	U.S. Fish and Wildlife Service
A. Talbott	Hocking Technical College
W. H. Taylor	Virginia Commission of Game and Inland Fisheries
S. Yarsa	Ohio State University

References

Artmann, J. W. 1977. Woodcock status report, 1975. U.S. Fish Wildl. Serv., Spec. Sci. Rep.—Wildl. 201. 36 pp.

Clark, E. R. 1970. Woodcock status report, 1969. U.S. Fish Wildl. Serv., Spec. Sci. Rep.—Wildl. 133. 35 pp.

Clark, E. R. 1972. Woodcock status report, 1971. U.S. Fish Wildl. Serv., Spec. Sci. Rep.—Wildl. 153. 47 pp.

Clark, E. R. 1973. Woodcock status report, 1972. U.S. Fish Wildl. Serv., Spec. Sci. Rep.—Wildl. 169. 50 pp.

Dobell, J. V. 1976. Preliminary report to Canadian woodcock singing-ground cooperators. Canadian Wildlife Service. 15 pp. Multilith.

Owen, R. B. 1977. American woodcock *(Philohela minor).* Pages 149-186 *in* Glen C. Sanderson, ed. Management of migratory shore and upland game birds in North America. Int. Assoc. Game, Fish and Conserv. Comm., Washington, D.C.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
EDITORIAL OFFICE
AYLESWORTH HALL, CSU
FORT COLLINS, COLORADO 80523

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
INT 423

SUPERINTENDENT
GREAT SMOKY MOUNTAINS
NATIONAL PARK
GATLINBURG
TN 37738

G30006

NOTE: Mailing lists are computerized. Please return address label with change of address.